CLAIMS

What is claimed is:

1. An image compression method comprising:

separating an image into a plurality of color channel sub-images;

processing each of said color channel sub-images by:

sub-sampling said sub-image;

transform coding said sub-sampled sub-image;

decoding said transform-coded image;

forming a plurality of square groupings of pixels in said decoded image;

predicting a value for a pixel within each of said x-shaped groupings;

determining a prediction error for each predicted pixel value within each of said square groupings;

coding said prediction error;

forming a plurality of at least partly diamond-shaped groupings of pixels in said decoded image;

predicting a value for a pixel within each of said diamond-shaped groupings; and

combining each of said processed color channel sub-images with said coded prediction errors, thereby forming a compressed image.

2. A method according to claim 1 wherein said separating step comprises separating said image into red (R), green (G) and blue (B) in RBG color space.

3. A method according to claim 1 wherein said separating step comprises separating said image into luminance (Y), chrominance (Cb) and chrominance (Cr) in YCbCr color space.

4. A method according to claim 1 wherein said sub-sampling step comprises sub-sampling to 1/4 of said sub-image size.

5. A method according to claim 4 wherein said sub-sampling step comprises:

grouping pixels of said sub-image into a plurality of sub-sampling groupings of four mutually-adjacent pixels; and

retaining one pixel in each of said sub-sampling groupings.

6. A method according to claim 5 wherein each retained pixel occupies the same position in each of said sub-sampling groupings.

7. A method according to claim 1 wherein said transform coding step comprises transform coding using discrete cosine transformation (DCT).

8. A method according to claim 1 wherein said transform coding step comprises transform coding using wavelet transformation.

9. A method according to claim 1 wherein said transform coding step comprises transforming to a compression ratio of between 4:1 and 12:1.

10. A method according to claim 1 wherein said image is a JPEG-compressed image having a first quantization table and wherein said transform coding step comprises transforming using a second quantization table whose size is less than or equal to the size of said first quantization table

of said image.

11. A method according to claim 1 wherein said predicting a value for a pixel within each of said square groupings step comprises:

setting said predicted value to the average of the values of three of said pixels in said square grouping where the values of said three pixels are greater than a mid-value and where the value of the fourth pixel in said square grouping is less than said mid-value;

setting said predicted value to the average of the values of three of said pixels in said square grouping where the values of said three pixels are less than said mid-value and where the value of the fourth pixel in said square grouping is greater than said mid-value;

setting said predicted value to the average of the values of two diagonally-opposed pixels in said square grouping where the absolute difference between the values of said two diagonally-opposed pixels is less than a threshold and where the absolute difference between the values of the other two pixels in said square is greater than or equal to said threshold; and

where said predicted value is not set in any of said setting steps, setting said predicted value to the average of all of said pixels in said square grouping.

12. A method according to claim 11 wherein said mid-value is 128.

13. A method according to claim 1 wherein said determining step comprises discarding said prediction error where said prediction error is greater than a maximum value or less than a minimum value.

14. A method according to claim 13 wherein said maximum value is 230 and wherein said

minimum value is 20.

15. A method according to claim 1 wherein said determining step comprises discarding said prediction error where the absolute difference between every two pixels in said square grouping is less than or equal to a first threshold.

16. A method according to claim 13 wherein said first threshold is 8.

17. A method according to claim 1 wherein said coding step comprises coding using Huffman codes where the absolute difference between every two pixels in said square grouping is less than or equal to a second threshold.

18. A method according to claim 17 wherein said first threshold is 16.

19. A method according to claim 17 wherein said coding step comprises entropy coding using Huffman codes where the absolute difference between any two pixels in said square grouping is greater than said second threshold.

20. A method according to claim 1 wherein said coding step comprises quantizing said prediction error using a quantization factor of 4.

21. A method according to claim 1 wherein said predicting a value for a pixel within each of said diamond-shaped groupings step comprises:

setting said predicted value to the average of a majority of said pixels in said

diamond-shaped grouping where the values of said majority are greater than a mid-value and where the value of at least one remaining pixel in said diamond-shaped grouping has a value that is less than said mid-value; and

setting said predicted value to the average of a majority of said pixels in said diamond-shaped grouping where the values of said majority are less than a mid-value and where the value of at least one remaining pixel in said diamond-shaped grouping has a value that is greater than said mid-value.

22. A method according to claim 21 and further comprising:

if said predicted value is not set in any of said setting steps,

setting said predicted value to the average of two horizontally-opposed pixels in said diamond-shaped grouping where the absolute difference between the values of said horizontally-opposed pixels is less than a threshold and where the absolute difference between two vertically-opposed pixels in said diamond-shaped grouping is greater than or equal to said threshold; and

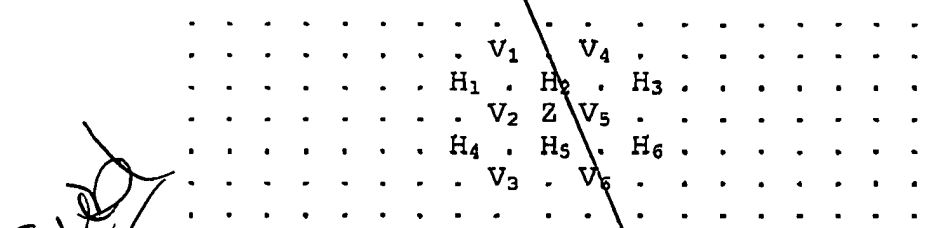
setting said predicted value to the average of two vertically-opposed pixels in said diamond-shaped grouping where the absolute difference between the values of said vertically-opposed pixels is less than a threshold and where the absolute difference between two horizontally-opposed pixels in said diamond-shaped grouping is greater than or equal to said threshold.

23. A method according to claim 22 and further comprising:

if said predicted value is not set in any of said setting steps,

forming a checkerboard grouping surrounding said pixel Z whose value is being

predicted from six vertically-aligned and six horizontally-aligned pixels as follows:



initializing a horizontal counter and a vertical counter to zero;

incrementing said horizontal counter if the absolute value of the difference between H1 and H2 is less than a threshold;

incrementing said horizontal counter if the absolute value of the difference between H2 and H3 is less than a threshold;

incrementing said horizontal counter if the absolute value of the difference between H4 and H5 is less than a threshold;

incrementing said horizontal counter if the absolute value of the difference between H3 and H5 is less than a threshold;

incrementing said vertical counter if the absolute value of the difference between V1 and V2 is less than a threshold;

incrementing said vertical counter if the absolute value of the difference between V2 and V3 is less than a threshold;

incrementing said vertical counter if the absolute value of the difference between V4 and V5 is less than a threshold;

incrementing said vertical counter if the absolute value of the difference between V3 and V5 is less than a threshold;

setting said predicted value to the average of said vertically-aligned pixels bounding pixel Z if said horizontal counter is greater than said vertical counter; and

setting said predicted value to the average of said horizontally-aligned pixels bounding pixel Z if said vertical counter is greater than said horizontal counter.

24. A method according to claim 23 and further comprising:

if said predicted value is not set in any of said setting steps, setting said predicted value to the average of all the pixels in said diamond grouping.